

WHAT IS CLAIMED IS:

1. A fluid dynamic bearing motor comprising:
a stationary member;
a rotating member configured to rotate about a rotational axis;
a fluid dynamic bearing configured to support relative rotation between the stationary member and the rotating member; and
a dynamic radial capillary seal defined at least in part by the rotating member.
2. The fluid dynamic bearing motor of claim 1, wherein the dynamic radial capillary seal comprises a first surface and a second surface, the first surface and the second surface being axially separated by a gap and configured such that the gap narrows with increasing radial distance from the rotational axis.
3. The fluid dynamic bearing motor of claim 1, further comprising a seal ring coupled to the rotating member, the seal ring including a first surface that partially defines a bearing fluid reservoir of the dynamic radial capillary seal.
4. The fluid dynamic bearing motor of claim 3, further comprising a seal shield coupled to the rotating member, the seal shield including a second surface that faces the first surface and partially defines the bearing fluid reservoir.
5. The fluid dynamic bearing motor of claim 4, wherein the first surface and the second surface are axially separated by a gap and configured such that the gap narrows with increasing radial distance from the rotational axis.
6. The fluid dynamic bearing motor of claim 3, further comprising a secondary capillary seal defined by an inner surface of the seal ring and an outer surface of the stationary member.

7. The fluid dynamic bearing motor of claim 6, wherein the inner surface of the seal ring and the outer surface of the stationary member diverge with increasing axial distance from the fluid dynamic bearing.
8. The fluid dynamic bearing motor of claim 6, wherein one or more channels are defined along the seal ring, the one or more channels configured to fluidly couple the bearing fluid reservoir to the secondary capillary seal and to the fluid dynamic bearing.
9. The fluid dynamic bearing motor of claim 6, wherein one or more end channels are defined along an outer surface of the seal ring, and one or more lower channels are defined along a bottom surface of the seal ring, the one or more end channels and the one or more lower channels configured to fluidly couple the bearing fluid reservoir to the secondary capillary seal and to the fluid dynamic bearing.
10. The fluid dynamic bearing motor of claim 9, further comprising one or more recirculation channels, each recirculation channel configured to couple a distal end of the fluid dynamic bearing to one of the lower channels defined along the bottom surface of the seal ring.
11. The fluid dynamic bearing motor of claim 10, wherein a circumferential channel is defined along the bottom surface of the seal ring, the circumferential channel configured to fluidly couple together the one or more lower channels defined along the bottom surface of the seal ring to each of the recirculation channels.
12. The fluid dynamic bearing motor of claim 10, wherein the fluid dynamic bearing is configured asymmetrically to pump bearing fluid away from the dynamic radial capillary seal to establish a circulation of bearing fluid through the

fluid dynamic bearing that returns bearing fluid to the dynamic radial capillary seal through the one or more recirculation channels.

13. The fluid dynamic bearing motor of claim 9, wherein the one or more end channels and the one or more lower channels are sufficiently shallow to establish strong capillary forces to maintain bearing fluid flow towards the fluid dynamic bearing.

14. The fluid dynamic bearing motor of claim 9, wherein one or more upper channels are defined in a flat region of a top surface of the seal ring, the one or more upper channels, the one or more end channels and the one or more lower channels configured with successively reduced cross-sections to enable capillary movement of the bearing fluid and spontaneous evacuation of air bubbles from the bearing fluid.

15. A fluid dynamic bearing motor comprising:
a stationary shaft;
a sleeve configured to rotate about a rotational axis, the sleeve being coupled to a hub such that the hub rotates about the rotational axis, the hub configured to support one or more discs;
a fluid dynamic bearing configured to support the relative rotation between the shaft and the sleeve; and
a dynamic radial capillary seal defined at least in part by the sleeve.

16. The fluid dynamic bearing motor of claim 15, further comprising a seal ring coupled to the sleeve, the seal ring including a first surface that partially defines a bearing fluid reservoir of the dynamic radial capillary seal, and a seal shield coupled to the sleeve, the seal shield including a second surface that faces the first surface and partially defines the bearing fluid reservoir, wherein the first surface and the second surface are axially separated by a gap and configured such that the gap narrows with increasing radial distance from the rotational axis.

17. The fluid dynamic bearing motor of claim 16, wherein an end channel is defined in an outer surface of the seal ring, and a lower channel is defined in a bottom surface of the seal ring, the end channel and the lower channel configured to fluidly couple the bearing fluid reservoir to the fluid dynamic bearing and to a second capillary seal, the second capillary seal defined by an inner surface of the seal ring and an outer surface of the shaft.

18. The fluid dynamic bearing motor of claim 17, further comprising a recirculation channel configured to couple a distal end of the fluid dynamic bearing to the lower channel, the fluid dynamic bearing configured asymmetrically to pump bearing fluid away from the dynamic radial capillary seal to establish a circulation of bearing fluid through the fluid dynamic bearing that returns bearing fluid to the dynamic radial capillary seal through the recirculation channel.

19. The fluid dynamic bearing motor of claim 17, wherein the end channel and the lower channel are sufficiently shallow to establish strong capillary forces to maintain bearing fluid flow towards the fluid dynamic bearing.

20. The fluid dynamic bearing motor of claim 17, wherein an upper channel is defined in a flat region of a top surface of the seal ring, the upper channel, the end channel and the lower channel configured with successively reduced cross-sections to enable capillary movement of the bearing fluid and spontaneous evacuation of air bubbles from the bearing fluid.